



# Breaklock to a Breaking Shaft

By Lt. V. J. Omundson

I was two months into my first long cruise as a pilot in the LAMPS community, and I gradually was settling into life as an H2P (helicopter second pilot) aboard USS *Elrod* (FFG-55). Flying to and from the back of the boat was just beginning to feel comfortable. Our mission for the day was a defensive-maneuvering training flight to rebase our breaklock currency, followed by SAR training for our quarterly requirements.

The helicopter-aircraft commander (HAC) and I had completed two breaklock maneuvers apiece. At the completion of my second one, we felt a distinct vibration as we climbed to 800 feet for the next breaklock. The vibration felt like it might be the start of retreating-blade stall, but we had not experienced this problem in the previous maneuvers. After all, vibrations in a helicopter are, to some extent, normal and the nature of the beast as we “beat the submission out of air.” We had been flying this aircraft exclusively for the last couple of weeks and were very familiar with it. This vibration felt unusually pronounced, so our crew discussed the situation and decided to conduct controllability checks to determine whether to continue with the mission or RTB.

The HAC took the controls, gained some altitude, and tried different flight regimes to see if the vibration

**A breaklock maneuver is a hard turn that may be accompanied by deployment of countermeasures in an attempt to break the lock on of a radar-guided missile.**

returned—it didn’t. After more discussion, the crew decided to continue training but agreed to knock it off if the vibration came back. The HAC entered her third breaklock, during which I heard a high-pitched humming noise. I would have mentioned this to the crew, but the noise didn’t seem out of the ordinary because we were in a high-power, high-speed, descending turn, and the noise disappeared as fast as it had appeared.

Completing her breaklock, the HAC climbed to 800 feet and passed me the controls. Our crewman called out a simulated threat, and I initiated my third





breaklock. I leveled off at 300 feet, rolled out, and began jinking to evade the simulated threat. The HAC announced we had defeated the threat, so the simulation was complete. I rolled out and was about to begin a cyclic climb when we heard a loud bang on the right side of the aircraft. It felt like the aircraft moved about a foot to the left. I immediately looked out the right window, a difficult move because I was in the left seat, thinking another aircraft had hit us.

*(Author's note: Afterward, on the ground, the aircrewman and HAC said they felt the aircraft yaw, which probably is what actually happened.)*

I heard my HAC call out, "I have the controls."

I responded, "Roger, you have the controls."

She began to execute and verbalize the engine-malfunction-in-flight procedure. As briefed, the flying pilot handled all immediate-action items requiring flight-control input, and I, the nonflying pilot, handled all immediate actions not requiring flight-control input. We still had not completely diagnosed the malfunction. We had about 150 knots, and because we were at such a high power setting, Nr immediately drooped, and we began to lose altitude. As the HAC lowered collective and traded airspeed for altitude, our descent came under control, and I continued to back her up on the instruments. The HAC

later told me that she thought she had been flying the whole time and had no recollection of taking the controls. Score one for training, standardization and habits.

Our crewman did an excellent job calling out altitudes and kept us aware of how low we were throughout the emergency. Only later did we realize he had his helicopter-aircrew-breathing-device (HABD) bottle in his hand and was ready to go into the water because he thought we had lost our transmission.

Once safe, single-engine conditions were met, we began to identify the malfunction. This task was challenging because we never before had seen these engine indications. Nr had drooped but was controlled, Np was overspeeding, and torque was low. The HAC called for the engine-high-side procedure to get Np under control. I placed my hand on the No. 2 engine's power-control lever (PCL) and waited for her to concur. As I did this, the aircrewman called Mayday over the radio.

Our controller asked, "Are you kidding?"

The HAC responded, "No. I need emergency-flight quarters and the OinC in combat—now!"

She then confirmed I had the correct PCL. I began to pull it back to the 6 o'clock position to set torque 10 percent below the good engine. I noticed torque already was at four percent, and Np was at 106 percent and



coming down as I decreased the PCL. The OinC came on the radio and asked what was going on. The HAC explained we had heard a loud bang and were going through the engine high-side procedures. As she flew the aircraft and explained the situation to the OinC, I continued to troubleshoot, trying to make sense of the conflicting engine indications. I concluded we had a high-speed shaft failure on the No. 2 engine.



Left to right: AW2 Jesse Kennett, Lt. Kylene Dau, Lt. V. J. Omundson.

When she finished talking to the OinC, I told her what I thought, and she immediately agreed. She told me to break out the checklist and to go through the procedures. We currently do not have a procedure for a high-speed shaft failure in the checklist, but we do have procedures for an impending high-speed shaft failure. With that procedure being closest to what we had, we continued through this emergency checklist.

I began the process of flipping through multiple checklists. The first step was the engine-malfunction-in-flight procedure, so I reviewed it to make sure we had not missed any steps. As we continued, we eventually had to shut down the No. 2 engine, leading to a single-engine landing. The ship did a great job setting emergency-flight quarters and closing our location at maximum speed. We dumped fuel to get light. Once we had completed the myriad checklists, we discussed our approach to the back of the boat.

The HAC explained she was going to fly the approach by the book, erring to the steep side, but to

back up her for a standard approach by the numbers. The HAC shot the approach and completed a clear-deck landing. We finished the shutdown sequence and gladly climbed out of the aircraft. The maintainers removed the engine-intake cowling and found the high-speed shaft completely split in two.


It wasn't until about two hours after the flight I remembered the humming noise on the second to last breaklock. Because I didn't mention it during the flight, I began to second-guess myself and wonder if the EP could have been prevented. I asked the crewman if he had heard anything. He said he had heard a whine, but it was consistent with sounds he had heard on other breaklock flights. He had not heard anything unusual during our flight. I also asked the HAC, but she hadn't heard the noise.

The NATOPS description for a high-speed shaft failure talks about a "howl" that may vary with collective as the shaft is failing. That was not what I heard, and I am not convinced the sound I heard was related to our EP. Is it possible I heard the sound of impending failure from the opposite side of the aircraft, when

neither the HAC, nor the aircrewman, who were both closer to the engine, had heard or recognized it?

We frequently simulate EPs, but the EP I had that day cannot be simulated in the aircraft or simulator. The pocket checklist has no procedures listed, but there is a "High-Speed Shaft Failure" section in the NATOPS manual. We experienced none of the indications the NATOPS

manual describes with this EP. In fact, even after the high-speed shaft had sheared, the engine still ran with all normal indications, except torque and Np. It was only because of our understanding of systems that we correctly diagnosed the problem and proceeded with appropriate action.

As aviators, we make a habit of reviewing our emergency procedures and systems. This EP amplifies the importance of studying systems and being prepared for any emergency. Don't assume that NATOPS or the pocket checklist have procedures for every situation you may encounter; they are not a substitute for sound judgment. 

Lt. Omundson flies with HSL-48.